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DESCRIPTION

1. The title of the invention: Information Processor

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2. What is claimed is
An information processor in a computer system which includes a floppy disk device as exterior storage device, wherein the floppy disk device having a locking machine of floppy disk entrance and a control means to control the locking machine of floppy disk
10   entrance, and the prohibitory state of the loading/unloading of the floppy disk is managed by file managing program, and in the prohibitory state, the locking of the floppy disk entrance is carried out by using the control means which controls the locking machine and the locking machine.

15   3. Detailed description of the invention
Technical Field
        The present invention relates to an information processor which includes a floppy disk as information storage medium, particularly, a file managing program and a floppy disk device which are appropriate for a system which attaches importance to
20   security.

Background Art
        In a general way, the loading/unloading is easily carried out in conventional floppy disk device, however, it has not been considered to prevent the destruction of the
25   files on the floppy disk due to user's misoperation of loading/unloading the floppy disk. Tokaisho No.59-92475 is a correlative invention.
        As above-mentioned, it has not been considered to manage the prohibitory state of the loading/unloading of the floppy disk and prevent the loading/unloading, therefore, there is a security problem for the data on the floppy disk.
30   The problem of the conventional floppy disk device will be explained using diagrams thereinafter.
        Fig.2 illustrates the block diagram of a system configuration example to explain the conventional problem. In Fig.2, 1 represents the main system. The main system 1 issues input/output control instruction to each control device of floppy disk devices,
35   keyboard, and CRT display, waits for their responses and carries out every kind of system control.
        11 in the main system represents the file managing program which controls the file on the floppy disk. 12 represents the input/output buffer which carries out data transfer between the floppy disk device and the main system. 13 represents the data area
40   of the main system.
        2 represents the floppy disk device (FDD), and 21 represents the floppy disk set on the FDD. 5 represents the FDD control device, and is connected to the main system via system bus 8 described in the later text, and receives instruction from the main system 1, and carries out the data transfer control between the main system 1 and FDD 2.
45   3 represents the CRT display, 6 represents the CRT display control device, 4 represents the keyboard, 7 represents the keyboard control device, and 8 represents the system bus connecting each input/output control device to the main system 1.
        Fig. 3 illustrates the details of the main system 1 and the floppy disk device 2 illustrated in Fig.2.

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212 represents one file on the floppy disk 21.

211 represents the directory information associated with the file on the floppy disk 21, such as the name of the file, the address on the floppy disk and the size.

111 represents the file managing table(FCB) which is necessary for the file
5 managing program 11 to read/write the file on the floppy disk. The file managing program 11 reads the directory information 221, and creates the file managing table based on the directory information 221. FCB 111 illustrates information such as the name of the file, the address on the floppy disk and the size, too.

112 represents the open processing program, 113 represents the close processing
10 program, 114 represents the read processing program, and 115 represents the write processing program. The file managing program 11 carries out reading/writing the floppy disk by these processing programs.

The process that the main system 1 carries out reading/writing the data of the file 212 on the floppy disk will be explained using Fig.3.
15 First, the main system 1 carries out file open processing to the file 212 by the open processing program 112.

In the open processing, the directory information 211 of the file 212 is temporarily read in the input/output buffer 12, and FCB 111 is created based on the information. The open processing to the file is carried out, and the file managing program
20 now can read/write the data of file 212.

Reading/writing the file 212 is carried out by the read processing program 114 and the write processing program 115.

The data which are read/written are transferred between the file 212 and the data area 12 via the input/output buffer 12 as illustrated in Fig.3.
25 When the size of the file 212, etc. are changed in the write processing, the information of the FCB 111 will be updated by the write processing program 115.

When the reading/writing of the file 212 ends, the main system 1 will carry out a close processing to the file 212.

In the close processing, the directory information 211 in the input/output buffer
30 12 will be updated based on the changed information of FCB 111 by the read/write processing. The directory information 211 will be written in the floppy disk together with the data of the file 212 which is not carried out a write processing in the input/output buffer 12, and the reading/writing of the file 212 ends.

The transfer of the data, and the referring and updating of the directory
35 information 211 when the file 212 is read/written are carried out via the input/output buffer 12. Furthermore, in order to decrease the times to read/write the floppy disk 21, for example, when writing out, the data stay in the input/output buffer 12 temporarily, the data are written out on the file at the time when the input/output buffer 12 is full. The last data set left on the input/output buffer 12 is carried out a close processing and is written
40 on the floppy disk 21.

That is, by the close processing, the information associated with the file 211 in the main system 1 side matches with the information associated with the file 212 in the floppy disk 21 side for the first time.

If the loading/unloading of the floppy disk is carried out in a state that the file is
45 opened under the control of the file managing program, the data on the input/output buffer will not be written on the inserted floppy disk, therefore, the logistic file data does not match with the actual data on the floppy disk.

Furthermore, the file managing program may carry out writing to newly inserted floppy disk based on the directory information of the floppy disk before

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loading/unloading. At this time, the content of this floppy disk may be destructed.

However, the conventional floppy disk device freely carries out the loading/unloading of the floppy disk, accordingly, the above-mentioned data destruction occurred due to user's careless loading/unloading of the floppy disk.

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Disclosure of Invention

It is an object of the present invention to prevent the data destruction before and after loading/unloading of the floppy disk due to user's misoperation of loading/unloading the floppy disk.

10   To realize the above object, the file managing program of the main system manage the open state and the close state of the file on the floppy disk, and there is a means to lock and release the floppy disk entrance according to the instruction from the file managing program in the floppy disk device. Even if only one file in the floppy disk is in the open state, the floppy disk entrance of the floppy disk device will be locked, and

15   the loading/unloading of the floppy disk is prohibited.

The file managing program manages the number of files which are opened on the floppy disk, when none of the files on the floppy disk is opened, the open processing is carried out, and an instruction to lock the floppy disk entrance is issued to the floppy disk device. When all files on the floppy disk are closed, an instruction to release the

20   locking of the floppy disk entrance is issued to the floppy disk device.

For this reason, the floppy disk device which has a locking means of the floppy disk entrance can control the loading/unloading of the floppy disk only when none of the files on the floppy disk is opened, and this can prevent the data destruction of the file due to user's misoperation of loading/unloading the floppy disk.

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Best Mode for Carrying out the Invention

(Embodiment 1)

With reference now to the attached drawings, Embodiment of the present

30   invention will be explained below.

Fig.1 is the block diagram of one embodiment of this invention.

1,2,5,8,11,21 are the same as in Fig.2. 14 represents a counter register newly added to the main system of this invention to monitor the exchange state of the floppy disk. The counter register manages the number of the files which are opened and not closed (in the

35   opening state) by the file managing program 11, when the power source is ON, the counter register sets the initial value as φ. 22 represents floppy disk entrance locking device.

51 is a floppy disk entrance locking control device which sends locking control signal to the floppy disk entrance locking device via control signal line 23 according to

40   the instruction of the main system 1.

116 is the open processing program which newly adds locking instruction to locking control device 51, and its processing steps are illustrated in the flowchart of Fig.4a.

117 is the close processing program which newly adds locking release instruction to locking control device 51, and its processing steps are illustrated in the flowchart of

45   Fig.4b.

The actions of this embodiment will be explained according to the block diagram of Fig.1 and the flowchart of Fig.4.

As shown in Fig.4a, at F1, the open processing checks whether the value of the counter register 14 is φ, if the value of the counter register 14 is φ, determines that there

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does not exist open file. At F2, a locking instruction is issued to the floppy disk entrance locking control device 51 from the file managing program, and the floppy disk entrance is locked by the floppy disk entrance locking device 22.

5   If the value of the counter register 14 is not φ, the processing determines that there exist open files and the floppy disk entrance has been locked, and skips the processing of F2.

After the floppy disk entrance is locked, a conventional file open processing is carried out at F3.

At F4, open files are added 1, and the value of the counter register 14 increases by 1.
10   The open processing ends.

On the other hand, as shown in Fig.4b, at F5, the conventional file close processing is carried out.

At F6, because the opened files decreased 1, the value of the counter register 14 only decreases by 1.

15   At F7, the value of the counter register 14 is checked, if it is φ, the processing determines that there does not exist open files, the locking release instruction is issued to the floppy disk entrance locking control device 51 from the file managing program 11, and the locking of the floppy disk entrance id released by the floppy disk entrance locking device 22. The close processing ends.

20   If the value of the counter register 14 is not φ, the processing determines that there exist open files and skips the processing of F8. The close processing ends.

The file managing program 11 carries out the above control when the files are open or closed, therefore, even if only one file of those files on the floppy disk 21 is in open state, the floppy disk entrance will be locked, and the misoperation of loading/unloading
25   the floppy disk can be prevented.

The circuit of one embodiment of the floppy disk entrance locking device 22 and its control device 51 will be explained by using Fig.5.

81 is the data bus from the main system 1, 82 is the address bus from the main system 1, and 85 is the I/O write signal from the main system 1.
30   511 is an address decoder, and 512 is a D flip-flop.

23 is a control signal line from the locking control device, 221 is a relay circuit switched on/off by the locking control signal, and 222 is a device to switch on/off the power source of solenoid 2221 based on the on/off of the relay circuit, and electro-magnetically lock the floppy disk entrance.
35   When the locking instruction or the locking release instruction is issued to the floppy disk entrance locking control device 51 from the main system, the signal of address bus 82 is decoded by the decoder 511, and the chip select(CS) signal 514 becomes LOW, and the CK of the D flip-flop is input a low signal. At this time, the main system will send high signal to the data bus 81 if the instruction is locking
40   instruction, and send low signal to the data bus 81 if the instruction is locking release instruction.

Therefore, the locking control signal line 23 becomes high when the main system issues a locking instruction, and becomes low when the main system issues a locking release instruction. If the relay circuit 221 switches the power source of the solenoid
45   2221 on when the locking control signal line 23 becomes high, and switches the power source of the solenoid 2221 off when the locking control signal line 23 becomes low, it is possible to control the locking of the floppy disk entrance (here, when the power source of the solenoid 2221 is switched on, the locking device electro-magnetically

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locks).

As above described, according to this embodiment, even if only one file of those files on the floppy disk is in open state, the floppy disk entrance of the FDD 2 will be locked, therefore, it is possible to prevent the data destruction due to misoperation of loading/unloading the floppy disk.

According to the embodiment, because the loading/unloading itself can be prohibited, this problem can be solved too.

According to this invention, even if only one file of those files on the floppy disk is in open state, the floppy disk entrance of the FDD will be locked, therefore, it is possible to prevent the data destruction due to misoperation of loading/unloading the floppy disk, and reliability of the FDD can be improved. Those who are familiar with the FDD can use the FDD securely.

Brief Description of Drawings

FIG.1 is a block diagram of one embodiment of this invention;
FIG.2 is a block diagram of system configuration example of this invention;
FIG.3 is a block diagram illustrating the file read/write processing;
FIG.4a and 4b are program flowcharts of file open processing and file close processing of this invention ;and
FIG.5 is a circuit diagram of the Embodiment carrying out the locking control of the floppy disk entrance.

1   main system
2   floppy disk drive
3   CRT display
4   Keyboard
5   Floppy disk drive control device
6   CRT display control device
7   Keyboard control device
8   System bus
11   file managing program
14   counter register
51 floppy disk entrance locking control device
22 floppy disk entrance locking device
116 open processing program
117 close processing program